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SIX NEW FALSE SPIDER MITES FROM SOUTHERN FLORIDA (ACARINA: TENUIPALPIDAE)

Donald De Leon
Coral Gables, Florida

The genus *Tenuipalpus* has twenty-five recognized species including those described below; ten species have been collected only in Florida, and two others primarily tropical in distribution also occur here. More than half the members seem to be host specific, but further collecting may reveal wider host acceptance. Nearly all the species are greatly flattened and a few are nearly as wide as long. Those I have collected appress themselves to the leaf when feeding so that at first sight, except sometimes for color, they look like young unarmoured scale insects; when moving, they have a peculiar fluttering motion.

Tenuipalpus tetrazygiae, n. sp.

T. tetrazygiae belongs to the group of species in this genus having one pair of anterior medioventrals and one pair of posterior medioventrals. It is distinguished from all other members of the group reviewed by Baker and Pritchard (1953)[1] chiefly by the small, elliptic to obovate mediodorsal hysterosomals and by the irregularly ridged dorsal surface of the body.

Female: Red; dorsal surface covered by irregular folds or ridges. Rostral shield broadly cleft, mediolateral lobe small; no lateral lobe. First and second dorsal propodosomals small, elliptic[2]; third dorsal propodosomal short (17 microns) narrow-elliptic, spiculate; humeral seta narrow-elliptic to obovate, spiculate, about half the length of third propodosomal; mediodorsal hysterosomals elliptic, first pair slightly less in length than half the distance between bases, second and third pair equal to or slightly less than transverse distance between bases; first three dorsolateral opisthosomals narrow-elliptic, spiculate, and shorter than, to about as long as, distance between adjacent bases; fourth flagelliform, exceptionally long, about as long as hysterosoma; fifth similar in shape to third but slghtly smaller. Pore present. Podosoma with one pair of anterior and one pair of posterior medioventrals. Ventral hysterosomals bare. Palpus with sensory seta on terminal segment, preceding segment with barbulate seta near distal end. Femora I and II with elliptic to setiform types of setae; patellae I and II each usually with two setiform setae anteromedially; patellae III and IV bare; tibia IV usually lacking anteromedial setae; tarsi I and II each with posterodistal sensilla. Length, including rostral shield, 291 microns; width 157 microns.

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[1] Baker, E. W. and A. E. Pritchard. 1953. A review of the false spider mites of the genus *Tenuipalpus* Donnadieu (Acarina: Phytoptipalpidae). Ann. Ent. Soc. Amer. 46 (3): 317-336.

[2] Elliptic is used to describe setae widest at the mid-section and lanceolate to describe those widest near the base.

MALE: Resembles female, except ridges of dorsum not as numerous or as pronounced.

NYMPH AND LARVA: Lack irregularly ridged dorsum, third dorsal propodosomal setiform and proportionally longer than in adult.

EGG: Red to orange; dorsal surface with longitudinal ridges; length 105 microns, width 79 microns.

Holotype: Female, west of Perrine, Florida, 15 November 1954 (D. De Leon) from *Tetrazygia bicolor*. *Paratypes*: Five females, three males, ten nymphs, seven larvae; same data as for holotype.

Tenuipalpus metopii, n. sp.

T. metopii belongs to the group of species in this genus which bears one pair of anterior medioventrals and one pair of posterior medioventrals; the mediodorsal hysterosomals are minute. *Metopii* has many of the characters given by Baker and Pritchard (*loc. cit.*) for *T. knorri* Baker and Pritchard from Argentina, but it differs from *knorri* among other characters by the absence of setae posteromedially on patellae I and II, by the absence of setae on patellae III, and by a strong carina extending longitudinally forward from the base of dorsolateral opisthosomal one.

FEMALE: Usually red (some specimens mostly greyish), translucent; dorsum rather smooth, a few weak striae extending diagonally down from third propodosomal; a carina or fold just behind second pair of mediodorsal hysterosomals; a longitudinal carina extending forward from base of first dorsolateral opisthosomal, carina becoming less distinct anterior to pore. Some specimens show a second carina arising from third dorsolateral opisthosomal and extending forward to where it nearly touches carina from first dorsolateral, both then continuing towards anterior margin of hysterosoma. Rostral shield deeply cleft; a small mediolateral lobe, and a small lateral lobe from the upper, outer edge of which the third dorsal propodosomal seta arises; first and second dorsal propodosomals minute, third short (25 microns in length), narrow-elliptic, spiculate; humeral seta about one third the length of third dorsal propodosomal, narrow-elliptic, and about as long as distance between adjacent bases, fourth flagelliform, fifth, half as long as third. One pair of anterior and one pair of posterior medioventrals. Ventral hysterosomals bare. Palpus apparently two-segmented, a seta at end of last segment; all ventral coxal setae barbulate; femora I, II, and III with both narrow-elliptic and setiform types of setae on anterior margin, posteromarginal seta of femur II narrow-elliptic; tarsi I and II each with posterodistal sensilla. Length of body, including rostral shield, 291 microns, width 192 microns.

MALE: Not known.

NYMPH AND LARVA: Body weakly striate; third dorsal proposomal proportionally longer, and dorsolateral opisthosomals one, two, three, and five more slender than in adult; fourth flagelliform.

EGG: Red to orange; longitudinal ridges on upper surface; length 105 microns, width 69 microns.

HOLOTYPE: Female, Coral Gables, Florida, 13 September 1955 (D. De Leon) from *Metopium toxiferum*. *Paratypes*: 18 females, 28 nymphs, 13 larvae; same data as for holotype.

Tenuipalpus bucidae, n. sp.

T. bucidae belongs to the group of species in this genus which bears one pair of anterior medioventral and one pair of posterior medioventral setae. The minute mediodorsal hysterosomals and the large dorsolateral opisthosomals, place it in the *micheli-podocarpi* complex. *Bucidae* has many of the characters given for the South African species *podocarpi* Lawrence by Baker and Pritchard (*loc. cit.*), but differs from their description and drawing (after Lawrence) in other characters including the location of the third dorsal propodosomal, the lack of a conical body-projection anterior to coxa III, and the absence of an enlarged seta on coxa III.

Female: Body, in live specimens, translucent, iridescent, pale yellow with tinge of green. Dorsum of body shagreened, without distinct striations except for a few extending diagonally in from lateral lobe. Rostral shield deeply cleft; a small mediolateral lobe and a more pronounced lateral lobe. First and second dorsal propodosomals minute, second adjacent to eye; third arising from about middle of outer edge of lateral lobe, very narrow, almost setiform, spiculate, about 42 microns in length and about a third as long as distance between its base and caudal margin of propodosoma; humeral seta oval, spiculate, about one third the length of third dorsal propodosomal; mediodorsals minute. First, second and third dorsolateral opisthosomals elliptic, spiculate and appreciably longer than distance between adjacent bases; fourth flagelliform, fifth narrow-elliptic to obovate, spiculate, and slightly smaller than third. Podosoma with one pair of anterior and one pair of posterior medioventrals; all ventral body-setae bare. Palpus apparently 1-segmented with a long, spiculate setae distad. Femora I and II each with setiform and elliptic types of setae, patellae I and II each with only anteromedial seta, tarsi I and II each with posterodistal sensilla, patella III bare. Length, including rostral shield, 270 microns, width 203 microns.

Male: Not known.

Deutonymph: Pale orange-yellow; third dorsal propodosomal setiform, proportionally longer than in adult; dorsolateral opisthosomals narrow, elliptic, except the fourth which is flagelliform.

Larva: Resembles nymph, but body-setae setiform.

Egg: Pale orange, shining, with faint longitudinal ridges dorsally. Length 84 microns, width 59 microns.

Holotype: Female, Fairchild Tropical Garden, Coconut Grove, Florida, 4 August 1955 (D. De Leon), from *Bucida buceras*. *Paratypes*: Three females, three nymphs, four larvae; same data as for holotype.

This mite is sometimes so numerous on *Bucida buceras*, a common street tree in Coral Gables, that it causes discoloration of the leaves.

Tenuipalpus hastaligni, n. sp.

T. hastaligni belongs to the group of mites in this genus having one pair of anterior medioventrals, one pair of posterior medioventrals and the mediodorsals minute. The third dorsal propodosomal is long and the first three dorsolateral opisthosomals are large. The mite appears to be closely related to *T. micheli* Lawrence from South Africa, but it differs among other characters from the description and drawing (after Lawrence)

given for *micheli* by Baker and Pritchard (*loc. cit.*) in that the third dorsal propodosomal arises from the base of the lateral lobe which is large; the posteromedial seta of femur II is ovate and extends only to about the distal end of patella II; the projection anterior to coxa III is triangular in outline, and patella IV is bare.

FEMALE: Body translucent, iridescent, pale yellowish with a tinge of green in live specimens; legs, especially basally, orange. Dorsum smooth with a few weak striae extending diagonally down from the lateral lobe. Rostral shield narrowly cleft; mediolateral lobe small; lateral lobe prominent, extending beyond base of femur II, broadly rounded at apex; a triangular body-projection anterior to coxa III. First and second dorsal propodosomals minute, third narrow-lanceolate, arising from base of lateral lobe, 66 microns in length and about half as long as distance between its base and posterior margin of propodosoma; mediodorsals minute; first, second, and third dorsolateral opisthosomals broadly elliptic, spiculate, and more than twice as long as the distance between adjacent bases, fourth flagelliform, fifth narrow-elliptic, nearly half the length of third; outer anteroventral propodosomal seta long (ending beyond apex of lateral lobe), barbulate; podosoma with one pair of anterior and one pair of posterior medioventrals, the posterior pair unusually long, extending beyond bases of the two pairs of genital setae; medioventral hysterosomals bare; anterior ventrolateral hysterosomal seta barbulate. Palpus with terminal sensory seta, preceding segment with barbulate seta near distal end; posteromedial setae of femur II ovate, extending to about distal end of patella; patella IV without seta, tarsi I and II each with a posterodistal sensilla. Length of body including rostral shield, 327 microns, width 262 microns.

MALE: Not known.

NYMPH: Third dorsal propodosomal narrow-lanceolate, shorter than half the distance between its base and caudal margin of propodosoma, and arising from base of a pronounced anteriorally directed lobe; no lobe anterior to coxa III.

EGG: Glassy white, elongate, with dorsal longitudinal ridges. Length 133 microns, width 59 microns.

Holotype: Female, Coral Gables, Florida, 13 September 1955 (D. De Leon), from *Ocotea coriacea*. *Paratypes*: Ten females, six nymphs; same data as for holotype.

Tenuipalpus coccolobicolus, n. sp.

T. coccolobicolus belongs to the group of species in this genus with two pairs of anterior medioventrals and one pair of posterior medioventrals. In Baker and Pritchard's key to the genus (*loc. cit.*) it keys to *carolinensis* Baker on the basis of its minute mediodorsal hysterosomals, but it differs from the description and illustration of that species chiefly by its being nearly as wide as long, by its third dorsal propodosomal seta arising from a prominent lateral lobe, and by its broad sub-quadrate lateral body-projection anterior to coxa III.

FEMALE: Body, in live specimens, translucent, shining, pale yellow with tinge of green. Dorsum sparsely shagreened, with a few weak more

or less transverse grooves medially. Rostral shield broadly cleft; mediolateral lobe pronounced and lateral lobe prominent; large sub-quadrate body-projection anterior to coxa III. First and second dorsal propodosomal setae minute (about six microns in length), elliptic; third dorsal propodosomal about 43 microns in length, narrow-elliptic, arising from the outer edge of lateral lobe, and about one-third as long as distance between its base and posterior margin of propodosoma; humeral seta one-third the length of third dorsal propodosomal, narrow-elliptic and arising from near base of sub-quadrate projection and behind its anterior edge; mediodorsal hysterosomals minute; dorsolateral opisthosomals one, two, and three narrow-elliptic, sub-equal in length, about twice as long as distance between adjacent bases; fourth flagelliform, fifth narrow-elliptic, about two-thirds the length of three. Pore present. Podosoma with two pairs of anterior and one pair of posterior medioventrals. Ventral hysterosomals bare. Terminal segment of palpus with sensory seta at distal end; preceding segment enlarged at base, barbulate seta arising from near distal end. Legs I and II each with narrow-elliptic and setiform types of setae; one pair of setae anteromedially on each of patellae and tibiae I and II; patella IV without seta, tarsi I and II each with sensilla posterodistally. Length, including rostral shield, 334 microns, width 308 microns.

MALE: Resembles female in general characters, but setae less robust.

NYMPH: Pale yellow; lateral lobe of propodosoma not developed; third dorsal propodosomal setiform, proportionally longer than in adult; sub-quadrate lobe anterior to coxa III not developed; fourth dorsolateral opisthosomal flagelliform.

EGG: Pale yellow; faintly ridged longitudinally. Length 100 microns, width 60 microns.

Holotype: Female, Coral Gables, Florida, 27 July 1955 (D. De Leon), from *Coccolobis laurifolia*. *Paratypes*: Five females, three males, two nymphs; same data as for holotype.

Tenuipalpus chiococcae, n. sp.

T. chiococcae belongs to the group of species in this genus which has two pairs of anterior medioventrals and one pair of posterior medioventrals; the mediodorsal hysterosomals are enlarged, but they are shorter than the transverse distance between pairs. In the key to the species by Baker and Pritchard (*loc. cit.*) it runs to *pigrus* Pritchard and Baker, but differs among other characters from *pigrus* by its third dorsal propodosomal being about a fifth longer than the first and elliptic to obovate, by its first three dorsolateral opisthosomals being shorter than the distance between adjacent bases, and by the absence of a pronounced body-projection anterior to coxa III.

FEMALE: Body, in live specimens, apricot. Dorsum raised centrally forming a prominent longitudinal ridge full length of body, near caudal margin narrow, declivous. Except at hysterosomal suture, dorsum strongly striate, striae convoluted forming intricate patterns. Rostral shield broadly cleft; mediolateral lobe small, acute; lateral lobe small, not extending beyond distal end of coxa II. First and second dorsal propodosomals oval to obovate, sub-equal in length, about half as long as width of

coxa II, each arising from a conical protuberance; third elliptic to obovate, ten microns in length, slghtly shorter than wdth of coxa II; humeral seta elliptic to oblanceolate, about as long as first dorsal propodosomal, and situated on a tubercle above a small anterolateral lobe of hysterosoma; dorsolateral metapodosomal seta oblanceolate about as long as humeral; mediodorsal hysterosomals narrow, oval and shorter than transverse distance between pairs; dorsolateral opisthosomals one, two, and three narrow-elliptic to oblanceolate, sub-equal in length, shorter than or equal to distance between adjacent bases, fourth flagelliform, fifth similar to two. Pore present. Podosoma with two pairs of anterior medioventrals and one pair of posterior medioventrals; ventral hysterosomals bare. Palpus with second segment strongly enlarged basad, barbulate seta arising from near distal end; terminal segment with sensory seta on distal end. Femora I and II with both narrow-elliptic and setiform types of setae, patellae I and II each with pair of setae medially on inner margin and one seta on outer margin, tarsi I and II each with posterodistal sensilla, patella IV and femur IV bare. Length, including rostral shield, 328 microns, width 174 microns.

MALE: Resembles female, but lateral lobe more pronounced, second palpal segment with a small projection near inner distal end, tarsi I and II each with two sensillae.

NYMPH: Third dorsal propodosomal setiform and proportionally longer than for female; first dorsolateral opisthosomal setiform.

LARVA: Resembles nymph.

EGG: Length 128 microns, width 86 microns; apricot; longitudinally ridged dorsally. In each species these longitudinal ridges are formed by a thin membrane that apparently covers only the upper surface of the egg. When mounted in Hoyer's Medium the membrane usually sloughs off. The eggs of both species of *Tuckerella* are similarly ridged.

Holotype: Female, west of Perrine, Florida, 28 September 1955 (D. De Leon), on *Chiococca pinetorum*. *Paratypes*: Three females, one male, nine nymphs, one larva; same data as for holotype.

The types of these six species have been deposited in the U. S. National Museum; paratypes in the University of Florida Collections, Gainesville.

CHINCH BUG CONTROL TESTS—1955 [1]

S. H. Kerr [2]
University of Florida, Gainesville

Records of very damaging attacks on St. Augustine grass lawns by the chinch bug *Blissus insularis* Barber date back into the last century. The ravages of this insect have been most marked in the past decade, however. The increase in reports of injury may be at least partially accounted for by the fact that many more St. Augustine grass lawns have been planted in recent years due to the rapid expansion of private housing and tourist facilities in Florida.

Previous tests on control of the chinch bug conducted by Kerr (1956) showed that emulsion concentrates of DDT and parathion were more consistently reliable than chlordane, dieldrin, strobane, and demeton. These 1954 trials also indicated that DDT and parathion could be used satisfactorily at lower dosages than those often used in Florida.

Methods and Materials: In 1955, DDT and parathion were compared with malathion and lindane in a factorial test contrasting the emulsion concentrate and granular formulations of the four insecticides. Dieldrin granules were also tried in one or two plots at each location.

There was particular interest in the performance of malathion, because the use of parathion has been banned in at least one community. Commercial spray operators have been interested in turning to malathion as a phosphatic substitute for the very effective parathion. Since it was not possible to make observations on the effectiveness of one versus two applications, the effects of a single application were followed over a six-week period.

Insecticidal dosages are shown in table 1. Granules were applied at about 1.5X the emulsion concentrate dosages since some previous experience indicated this was necessary to get comparable control. Emulsion concentrates were applied with a sprinkling can at the rate of five gallons of liquid per 100 square feet of lawn. The granules were shaken from a jar with a perforated lid, and then washed from the grass foliage by light sprinkling. Care was taken to ensure that the soil was moist prior to application of the toxicants.

Chinch bug counts were made, as in 1954, by sampling one square foot of each plot with a flotation method. The sample was taken where it was estimated that the population level in each plot was highest. A pre-application count was made. The pre-application counts were arranged *á seri-*

[1] Florida Agricultural Experiment Station Journal Series No. 470.

[2] The writer wishes to extend his deep appreciation for the help given in conducting these tests by Mrs. Kerr and by Mr. Frank A. Robinson. Securing of test sites was made possible through the cooperation of Mr. Sidney Kirkpatrick in Fort Lauderdale, and Messrs. Robert L. Perry and C. M. Coursen in Tampa.

atum and the list was divided into high, medium, and low populations. In Tampa, the average number of chinch bugs per square foot in the high, medium, and low population replicates was 155.3, 74.9 and 45.7 respectively. At Fort Lauderdale, there was room for only two replicates, and the pre-application count was split into high versus low population (averages of 51.3 and 14.1 chinch bugs per square foot respectively) to determine the placing of the replicates. The location of the plots within the replicates was randomized. Plot size at Tampa was 43.5 square feet, and at Fort Lauderdale 65 square feet.

TABLE 1.—Insecticides and Dosages.

Insecticide	Amount of active ingredient per acre in pounds	
	Emulsion concentrate	Granules
DDT	10	15
Parathion	1.5	2
Malathion	6	10
Lindane	2.5	4
Dieldrin		8

The insecticides were applied on June 7 in Fort Lauderdale and on July 12 in Tampa. Subsequent counts were taken at two-, four-, and six-week intervals. The plots at Tampa were inadvertently sprayed by the cooperator there just prior to the six-week count, so the data for the count at that time are not included in the combined analysis for the two locations in table 2. In Fort Lauderdale, there were seven inches of rain during the first two-week interval and 1.71 inches in the following two-week interval. This was considerably less than the 12⅛ inches that fell there during the three-week testing period in 1954. The rainfall in Tampa was less extreme in both seasons.

Results: The data for locations 1 and 2, and for the two- and four-week counts, were combined and subjected to an analysis of variance. There was no interaction between locations and insecticides as there was in 1954 when the tests were conducted on widely differing types of turf at locations over 300 miles apart. With some of the insecticides, there was a statistically better control with one formulation or the other but the differences were too small to have practical meaning.

The finding of a significant F for replicates within locations was not unexpected and was also observed in 1954. It indicates that the level of the population at the start of the test may have an effect on the results attained. The number of chinch bugs left in the plots which had a high population at the start of the test was larger than the number left where the population was low at the outset.

The significant F value for locations probably reflects the fact that the average population at the start of the test at Tampa was much larger than the population at Fort Lauderdale. Yet the numbers of chinch bugs at the end of the test were nearly the same for each location.

The significance of the differences between treatment means was examined by Duncan's (1955) multiple range test. Results are shown in Table 2. At the time of the first or two-week count, all treatments reduced

chinch bugs populations significantly from the check. There were no significant differences among control figures for lindane, parathion, and DDT formulations. Malathion formulations were significantly less effective than parathion and DDT at the rates tested. By the multiple range test, however, some lindane means were not significantly different from some malathion means. Lindane, then, was intermediate between malathion and DDT or parathion in effectiveness. At the four-week count malathion formulations did not give significant reductions from chinch bug numbers in the check. Lindane, parathion and DDT formulations all gave significant reductions from the check at the four-week count and were not significantly different from each other. Dieldrin gave practically no control in the plots where it was tried.

TABLE 2.—Numbers of Chinch Bugs per Square Foot. Average from Combinations of All Replicates at Two Locations.*

	Check	Mal. Gr.	Mal. E. C.	Lind E. C.	Lind. Gr.	Par. E. C.	Par. Gr.	DDT E. C.	DDT Gr.
Pre-treatment count	68.6	63.2	80.2	54.8	83.4	68.2	57.4	77.6	61.0
2 Weeks	72	26.8	17.6	4.8	3.6	1.8	0.0	2.0	1.8
4 Weeks	71.4	81.0	38.6	9.6	7.4	3.4	1.2	3.2	1.0

* Any two means underscored by any given line are not significantly different from each other at 5 percent level. Any two means not underscored by the same line are significantly different.

A decline in the residual effectiveness of the insecticides with the passage of time is clearly shown. A significant F for counting dates X insecticides was expected, and table 2 shows that malathion, particularly, had rapidly lost its ability to control the insects. The other insecticides were not as effective in control after four weeks as after two weeks, although the numbers of bugs were still below a damaging level. It was pointed out above that the six-week counts could not be included in the analysis, but the data obtained showed a rapid rebuilding of chinch-bug numbers for most of the other materials. Parathion plots, especially, had large numbers of bugs present after six weeks, although DDT-treated plots still showed consistently small numbers of insects.

Although the average reduction in chinch bug numbers by lindane was not significantly different from that by DDT and parathion, lindane's performance was not as impressive because of its erratic control. While all of the parathion and DDT plots had counts ranging between 0 and 8 chinch bugs per square foot, lindane plots included some with counts of 14, 16, 18, 19, and 32 bugs.

Summary: A test for the control of chinch bugs on St. Augustine grass lawns was conducted at two locations with emulsion concentrate and granular formulations of DDT, parathion, malathion, and lindane. Malathion failed to give satisfactory control. Chinch bug numbers in some lindane plots were rather high, although the average control figure for this material was satisfactory. Granular formulations gave practically the same control as emulsion concentrates. All treatments except malathion formulations still showed very satisfactory average control four weeks from the date of application. Only DDT-treated plots had small numbers of chinch bugs after six weeks.

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Kerr, S. H. 1956. Chinch bug control on lawns in Florida. Jour. Econ. Ent. **49**(1): 83-85.

NOTICE OF ANNUAL MEETING

The Thirty-Ninth Annual Meeting of the Florida Entomological Society will be held on August 30-31, 1956, at the Floridan Hotel, Tallahassee. This is the first meeting of the Society to be held in the state capitol and advance planning indicates that it will be one of the best. In addition to the program of presented papers, a tour of the North Florida Experiment Station is planned as part of the program.

So that the program can be printed in time for members to receive their copies before the meeting, all persons planning to present papers should submit the title and time required for presentation to Dr. S. H. Kerr, Department of Entomology, Agricultural Experiment Station, University of Florida, Gainesville, Florida, before July 31.

BRUMUS SUTURALIS, A BENEFICIAL LADY BEETLE

ALLEN G. SELHIME [1]

Brumus suturalis (F.) is a beneficial insect collected in Pakistan.[2] This lady beetle occurs all over India, Ceylon, and the Philippines, and at Lindi, Tanganyika Territory, East Africa (Kapur, 1942). It feeds on mites, psyllids, whitefly eggs and nymphs, aphids, some scale insects, mealybugs, and leafhopper eggs (Kapur, 1942; Rahmon, 1940). It is also reported to feed on the pollen of some grasses (Kapur, 1942).

The beetles were sent from Pakistan to the parasite introduction receiving station at Moorestown, N. J., for identification and quarantine purposes. The first shipments of *Brumus* from Moorestown reached the Fruit Insects Laboratory in Orlando, Florida, on September 21 and 29, 1954. The first one consisted of six beetles, which were released immediately on the laboratory grounds. The adults crawled from the shipping container as soon as it was opened, flew to the grapefruit tree under which they were released and began to search for food. The second shipment consisted of 37 adults, which were put in rearing jars.

The adult beetle is a small, oval insect about ⅛ inch long. The head and thorax are brown, the eyes black, and the wing covers ivory with two black stripes, one extending down the trailing edge and the other through the middle of each cover (Fig. 1). No other lady beetles in Florida have similar markings. The adults run rapidly over the plants and fly readily. When disturbed, as in handling in the laboratory, the beetles draw up their legs and remain quiet momentarily.

Under laboratory conditions the life cycle has required as few as 19 and as many as 31 days. Low temperatures and a meager food supply increase the time required for them to complete their development.

Eggs are laid in clusters of 2 to 20, averaging 12 per cluster (Figure 2). They are laid shingle-like, in crevices formed by overlapping leaves, in curled leaves, or at the junction of leaf and stem. A folded paper towel, with quarter-inch folds stapled together, has proved to be a very satisfactory means of collecting eggs in the laboratory. Eggs were collected once a day. The egg is yellow with a trace of orange shading, and is shaped like a cigar with rounded ends. Under magnification of 20X or more it appears to have numerous shallow depressions in the shell. The egg stage lasts from four to six days. At an average of 85° F. (78°-89.5° range) the eggs started hatching on the fifth day.

The larva goes through four instars (Figures 3, 4, 5). When newly hatched it is smoky-gray and fuzzy, but with each molt the body becomes more elongated and the spine- or seta-bearing projections are seen more easily, occurring in four rows down the back of the abdominal segments.

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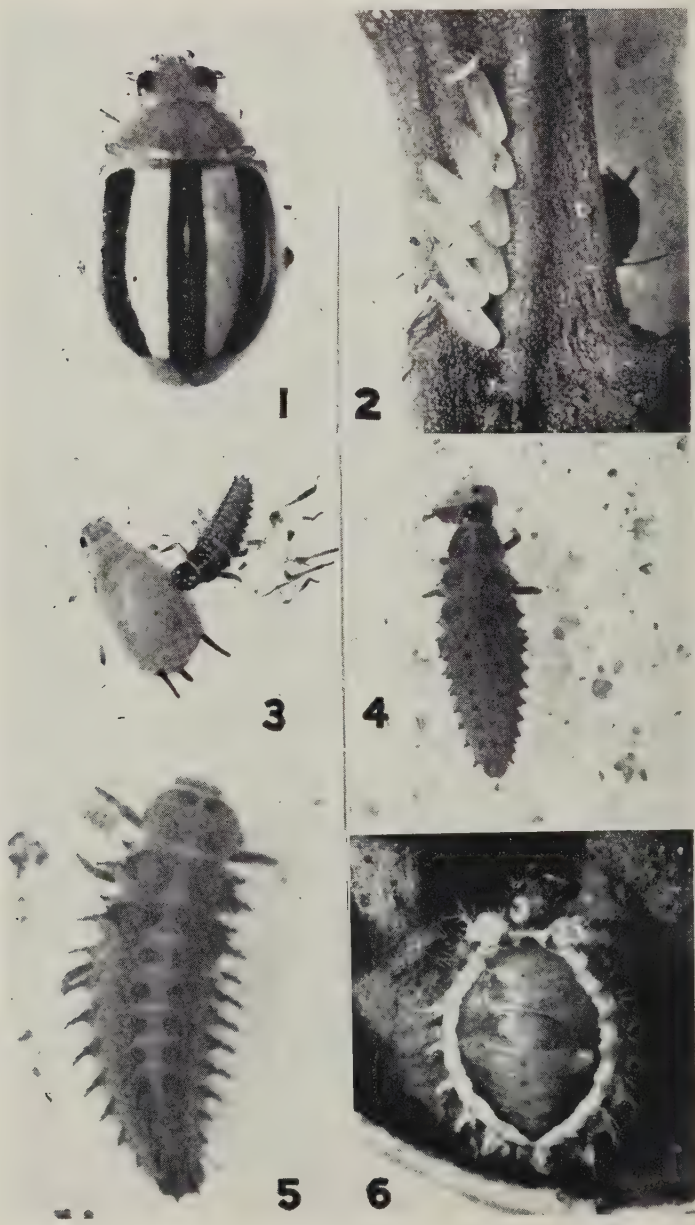
[1] United States Department of Agriculture, Agricultural Research Service, Entomology Research Branch. This work was done under the supervision of Herbert Spencer. Eugenia C. Parker, Wendall N. Spreadbury, Jr., James L. Sligh, and Paul A. Norman assisted in the rearing work.

[2] By George W. Angalet, of the Entomology Research Branch.


1
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The average larval period was 12 days at a mean temperature of 85° F., and a day or two longer at 79°.

Before pupating the larva attaches itself by its last abdominal segment to a leaf or some other suitable surface. The pupa is encased in the last larval skin (Figure 6). It is cream-colored, but some individuals may be darker than others. The pupal period lasts from four to six days, with an average of five days.

The adults are a creamy white when they first emerge, but soon assume their markings and coloration. They mate on the third or fourth day after emergence. Eggs are produced by the fifth day.

Brumus suturalis has been reared in the laboratory on mixed colonies of the green citrus aphid (*Aphis spiraecola* Patch), the melon aphid (*A. gossypii* Glov.), and the black citrus aphid (*Toxoptera aurantii* Fonsc.). When citrus aphids were difficult to find, the beetles were fed on aphids collected from other plants. Two species of *Macrosiphum* have been used. *M. ambrosiae* (Thos.), found feeding on the grass-leaf wild lettuce (*Lactuca graminifolia* Michx.), was used successfully, and *onagrae* Patch, found on the weed *Gaura angustifolia*,[3] to a lesser extent. The cabbage aphid (*Brevicoryne brassicae* [L.]) was tried, but most of the *Brumus* larvae and adults would not feed at all on this aphid.

In addtion to the aphids, *Brumus* has eaten the citrus mealybug (*Planococcus citri* [Risso]), the green scale (*Coccus viridis* [Green]), eggs and nymphs of the citrus whitefly (*Dialeurodes citri* [Ashm.]), and the cloudy-winged whitefly (*D. citrifolii* [Morg.]), and eggs of the citrus red mite (*Metatetranychus citri* [McG.]). The *Brumus* larvae exhibit cannibalism under crowded conditions or if the natural food supply is limited. They will also attack larvae of other lady beetles and syrphid flies if no other food is available.

Nineteen releases of this predator have been made in Florida, and four shipments have been sent to other places. The groves for the releases were selected with the help of county agents.[4] Groves on a no-spray program were chosen to give the beetles the best possible chance of becoming established. Temple oranges and tangerines were selected when possible, as they put out flushes of new growth more readily and furnish a better supply of aphids than other varieties. Of the Florida releases ten, totaling 1,213 reared adults and larvae, were made in Orange County; six, totaling 702 adults, in Lake County; and one each in Marion (97 adults), Indian River (134 adults), and St. Lucie (175 adults) Counties.

One release was made at the Orlando laboratory on July 15. Two hundred forty-nine larvae in various stages were placed on and around a hibiscus bush heavily infested with the melon aphid. Some completed

[3] Identification of these weeds was made by Erdman West, of the University of Florida.

[4] Robert E. Norris of Lake County, Jack McCown of Indian River County, and Henry Swanson of Orange County.

Figure 1. Adult *Brumus suturalis* F.
Figure 2. Egg cluster.
Figure 3. Day-old larva attacking aphid.
Figure 4. Third stage larva.
Figure 5. Mature larva.
Figure 6. Pupa.

their development, as adults were seen on the bush from July 25 through August 4.

Shipments outside of Florida included 40 larvae sent to the Moorestown laboratory for testing purposes; 36 adults to Riverside, California, and 65 adults to Brownsville, Texas, for rearing; and 78 to Mexico City for liberation.

In the ten months that we have had *Brumus*, nine complete generations have been reared and the tenth is now in progress. There is much to learn about these beetles, but we believe that they may do considerable good for the citrus and vegetable growers in Florida when they have become established.

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Rahmon, K. A., and *Nath, R.* 1940. Bionomics and control of the Indian sugarcane leafhopper, *Pyrilla perpusilla* Wlk. (Rhynchota, Fulg.) in the Punjab. Bul. Ent. Res. 31(2): 179-190.

The Sub-Tropical Entomologists of Florida have continued to meet at 7:30 P. M. on the second Wednesday of each month at the North Campus, University of Miami. At the three meetings from March to May, the speakers were Dr. D. O. Wolfenbarger, Dr. F. Gray Butcher, Dr. John E. Porter, Mr. G. W. Dekle, Mr. Luis G. Daigle, Mr. Harold Denmark, and Mr. Herman S. Mayeux.

At the May meeting, the methods being used to eradicate and the life history and ecological relations of the Mediterranean Fruit Fly were discussed. A resolution of commendation was approved of the work done by the officials on the Mediterranean Fruit Fly eradication. The Society also offered to help officials in every way possible to accomplish their objective.

ALFRED S. MILLS
Secretary-Treasurer

REPORT ON A COLLECTION OF MALLOPHAGA, LARGELY MEXICAN (PART II)

M. A. Carriker, Jr.

(*Continued from p. 43, Vol. 39, No. 1*)

Degeeriella angusta (Giebel), 1874

(Figures 43 and 44)

Nirmus angusta Giebel, Insecta Epizoa, p. 126. Host: *Buteo*[5] *lagopus* (Pontoppidan).

Giebel's description gives very few characters not common to many species of the genus; however there is nothing which does not agree with the specimens before me from *Buteo lagopus sancti-johannis*. Also, to further corroborate this identity, Hopkins & Clay give the same species of *Craspedorhynchus* from both *Buteo l. lagogus* and *B. l. sancti-johannis*, so that there seems to be no valid reason for not doing the same with *Degeeriella*, particularly since the two hosts are very closely related subspecies.

The only character of value mentioned by Giebel in his description of the species is the shape of the prothorax ("rectangular"), which agrees with the present specimens. These have the exposed sides of the prothorax nearly straight and the posterior angles but slightly curved. Most species of this genus have the prothorax with noticably convex sides. No measurements are given by Giebel.

Diagnosis.—There is a slight sexual dimorphism in the shape of the head and structure of the preantennal carina; the male has the frons flatter and narrower than the female; the carina is slightly wider and is *unbroken* medially at the frons, while in the female there is a decided interruption (see figure); there are four setae "canals" on each side of the frons, more or less as in *falconoidea*. The abdomen is very similar to that of *borealis*, with no special distinguishing characters.

The male genitalia are closer to *falconoidea*, but the shape of the endomera is quite different, with much smaller lateral wings and concave posterior margin, while the penis is much shorter. The distinguishing characters seem to be the shape of the preantennal portion of the head, the sexual dimorphism of the head, the shape of the prothorax and the male genitalia. The species is represented by 2 males and 2 females from *Buteo lagopus sancti-johannis*, collected by R. Baker at Colorado Co., Texas, March 23, 1941; also by 3 females in my collection from the same host collected by J. S. Hunter, at Lincoln, Nebraska, October 9, 1894.

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[5] There seems to be a strong similarity between specimens of parasites from the different groups of raptores, those from *Buteo* being of one type, with longer head and heavy preantennal carina with flattened frons and often with strong sexual dimorphism of the head. Those from *Falco* are smaller, with shorter, more rounded head, and those from the kites have a long head, tapering to a narrow frons, these last being the most aberrant forms of the genus that I have seen.

Measurements of Types of *D. genitalis* and Male and Female of *D. angusta* (Giebel).

	genitalis				*angusta*			
	Male		Female		Male		Female	
	Length	Width	Length	Width	Length	Width	Length	Width
Body	1.94	.....	1.96	.....	1.78	.....	2.09	
Head (at clavi)	.....	.39	.....	.39	.....	.391	.....	.412
Head (at temples)	.564	.43	.564	.423	.53	.413	.586	.445
Prothorax	.163	.287	.185	.28	.165	.222	.19	.26
Pterothorax	.205	.434	.205	.434	.185	.375	.185	.435
Abdomen	1.14	.564	1.193	.57	1.025	.477	1.30	.54
Antennae	.22	.045	.228	.048	.....	.....	.....	.....
Basal plate	.128	.087			.24	.086		
Paramers	.077	.076			.036	.015		
Endomera	.063	.066			.043	.056		

Genus *Picicola* Clay & Meinertzhagen, 1938.

Genotype: *P. praeposterus* Clay and Meinertz. Host: *Dendrocopus assimilis*. The genus was originally established for three species of Ischnocera, parasitic on the Picidae, the genotype from India and the other two from Africa (*P. campethera* and *P. thripias*). I have not seen material of any of these three species, but have two pairs of *P. marginitulus* Harrison (= *Nirmus marginatus* Osborn) from *Dryocopus pileatus picinus*, as well as several undescribed species from neotropical hosts. In the present collection there is a series of six specimens of the genus from *Melanerpes carolinus zebra* (Boddaert) which are very closely related to *P. praeposterus*, the genotype.

Later (in the 1952 checklist) other species, not parasitic on Picidae, were placed in the genus, one of them, *Nirmus foedus* Kellogg and Chapman, 1899, is of special interest. This species, together with closely allied forms, is found on very many species of Passerine birds, both of North and South America, especially on the Tyrannidae and Furnariidae, and I am very doubtful of its congeneric relationship with *Picicola*. In typical *Picicola* the dorsal preantennal carinae encircle the whole front of the head from base of clavi, unbroken and uniform in width, heavily chitinized, and with four to six narrow "canals" across it on each side of the anterior portion, leading to marginal setae; the sternal carina also encircles the front but it is not always heavily chitinized and is somewhat wider than the dorsal carina. The inner carina, attached to the anterior mandibular condyle and the outer carina, encircles the large buccal cavity parallel to the maginal carina. There is no trace of any plate in the front of the head as in *Oxylipeurus, Trogonirmus, Epicolinus* and *Cotingacola*.

In the *Nirmus foedus* group we have the preantennal carina heavily chitinized to the point where the sides of the head begin to curve around the frons, and here it is almost broken in some species and entirely so in others. From this point the carina widens and continues unbroken and

faintly chitinized around the frons, with 4 short, stout setae across its posterior margin. Posterior to this encircling, marginal carina the front of the head is filled by a plate extending backward to the point where the marginal carina is almost broken and where there is unquestionably a somewhat obsolete preantennal suture crossing the head. The posterior margin of this frontal plate is more or less thickened and corrugated, the whole front of the head resembling very strikingly that of the species of *Oxyliperus* found on the genus *Ortalis*.

This group contains numerous, quite distinct species. Many of those from South American Tyrannidae and some Furnariidae tend to have the frons slightly pointed instead of flatly convex as in *Foedus*, but all have the same type of genitalia, abdominal structure, chaetotaxy and head structure, with the transverse suture very clear in some species, slightly obscured in others.

The abdominal tergites are continuous transversely in both sexes, quite strongly chitinized in some species, less so in others (almost colorless). The male genitalia resembles those of typical *Picicola* but differ in several details. The abdomen in the males is very small, tapering rapidly posteriorly from segment V to VIII, but IX is comparatively large, larger than in *Picicola* (see figures).

It seems logical to me that this large group of species, parasitic on entirely different families of birds, and with head structure so distinct, should merit at least subgeneric rank, and I have, accordingly, given them the name *Tyrannicola* subgenus novum, since they are most abundant on the Tyrannidae.

Picicola praeposterus americana, n. subsp.
(Figures 45 and 46)

Types, male and female adults, from *Melanerpes carolinus zebra* (Boddaert), collected by G. H. Lowery at Lawrence, Kansas, October 27, 1946 (in L. S. U. M. Z. coll.).

Diagnosis.—These specimens are in very poor condition for describing and figuring. They are possibly immature and were also evidently left too long in the clearing solution, so that many important details are invisible. This is very unfortunate since they constiute the second record of the genus from the New World, and the specimens are very similar to the genotype, apparently conspecific with it, differing more from *marginatula* (mentioned above) than from *praeposterus*. Unfortunately, Miss Clay gave no measurements with her description of the genotype, and only figured the head and genitalia, so that it is impossible to give full details of the differences between the two races.

The anterior portion of the head is more uniformly rounded in *americana*, with sides more divergent; the preantennal carina is wider, marginal, and uniformly, but not deeply, colored; the marginal temporal carinae are also narrow, very slightly submarginal, and pitchy black; the carinae of the thorax are also deeply colored (dark brown, almost pitchy in anterior portion of pterothoracic carinae).

Very little can be distinguished of the abdominal structure; however, the chaetotaxy seems to be the same as described by Clay for the male, excepting on segment IX, where in *americana* there are many more setae on the sides.

Miss Clay does not mention the abdominal sternites, but they are more deeply pigmented in *americana* than the tergites, which can be distinguished with difficulty, and are entire transversely but widely separated from the pleurites, and are visible only in the posterior segments of the abdomen. There is a faint outline, uncolored, of the cellulation along the inner edge of the cephalic carina, which is so conspicuous in several undescribed species in my collection and which is shown in the figure of *praeposterus*.

The genitalia are not clearly visible in the three males of *americana*, and the details of the median portion of the mesosome are impossible to delineate, so that there may be some errors in the figure here presented. The type of genitalia is the same, however, as in *praeposterus*, differing only in details, which, together with the other characters mentioned above, are sufficient to warrant subspecific rank.

There is one immature male in the series which presents a curious variation from the adults in the chaetotaxy of the entire body, all setae being almost double the length of those of the adults, even to the abundant setae on segment IX. This male must be in the preadult stage, since the genitalia are quite well developed, though they differ in some details from those of the adults.

The tip of the abdomen of the female agrees with Clay's description, being rounded and slightly bilobed; there is a small, pigmented, transverse sternite across anterior portion of IX; the sternite in VI is deeply colored and that in V somewhat less, while in I to IV the sternites are not visible.

Across the posterior portion of VII may be seen a flatly curving line, which is, apparently, the posterior margin of the genital plate ("valve" of Clay) and which is sparsely set with short setae.

Measurements of the Type of *Picicola praeposterus americana*.

	Male		Female	
	length	width	length	width
Body	1.58	.....	1.74	.....
Head (at clavi)	.....	.293	.....	.326
Head (temples)	.475	.347	.495	.358
Prothorax	.14	.25	.152	.25
Pterothorax	.13	.38	.152	.37
Abdomen	.87	.445	1.02	.446
Basal plate	.25	.10		
Paramer	.06	.....		
Endomera	.054	.086		

This structure may be clearly seen in *P. marginatula*, as well as in other undescribed females of my collection. Clay says of the female of *praeposterus*: "somewhat similar to the male, with thorax and abdomen broader," but gives no further details. In the females of *americana*, and other undescribed forms, the abdominal tergites are clearly divided medially, but in the males which I have seen they are entire. The tergites in most

specimens are very faintly colored, and often quite invisible in the median portion of abdomen, so that their divided character is easily overlooked. The species is represented by the male holotype, female allotype, 1 male and 1 female adult and 2 male immature paratypes.

Subgenus *Tyrannicola*, new subgenus
Type species: *Nirmus foedus* Kellogg & Chapman, 1899.

DIAGNOSIS.—Most nearly related to *Picicola* Clay and Meinertz., from which it differs in the structure of the anterior portion of the head, resembling in this respect species of *Oxylipeurus* parasitic on the genus *Ortalis*.

Differs also in the sexual dimorphism of the abdomen and antennae, the antannae of the males being longer and with larger first segment than in the females. In the genotype this character is not conspicuous, but in other undescribed species the 1st antennal segment in the male is twice as large as in the female; the abdomen of the male is slender apically and very small with segment IX large (see figure of *T. rubina*, n. sp.).

For more complete details of the differences between *Picicola* and *Tyrannicola* see remarks under *Picicola* on previous pages.

Picicola (*Tyrannicola*) *foedus* (Kell. & Chap.) 1899
(Figures 47 and 48)

Nirmus foedus Kellogg and Chapman, Occ. Pap. California Acad. Sci., 6, p. 87, Pl. VI, fig. 7. Hosts: six hosts are given, three of them Tyrannidae, and the first mentioned is *Myiarchus c. cinerascens*. I have not seen specimens from *M. cinerascens* but have a series from another of Kellogg's hosts, viz: *Tyrannus verticalis* (Sioux Co. Nebraska), and from *Sayornis phoebe*, while he gives *S. s. saya* as one of his hosts. Since no particular host was designated by the describers I herewith designate *Tyrannus verticalis* as the type host of *Nirmus foedus*.

I also present figures of the male of this species from *Tyrannus verticalis*, together with the genitalia. Apparently these specimens are slightly immature, or were cleared too much, since the details of the abdominal structure, especially in the male, are not clearly visible. Also the abdomen of the male seems to be expanded laterally, specially in the posterior portion, being much wider than in other, closely related species of the genus (see figure of male of *P. rubina*, described below).

The species has been quite fully described under the remarks concerning the genus *Picicola* and *Tyrannicola* on previous pages.

Picicola (*Tyrannicola*) *rubina*, n. sp.
(Figure 49)

Types, male and female adults, from *Pyrocephalus rubinus mexicanus* Sclater, collected by R. Newman at Xilitla, San Luis Postosí, México, January 25, 1947 (in L. S. U. M. Z. coll.).

DIAGNOSIS.—Male very much smaller than male of *P. t. foedus*, especially in thorax and abdomen; sides of head in preantennal portion more divergent, with frons narrower and slightly pointed medially (see figure).

Abdominal segments I to III are much longer than the remainder, and

longer than in *foedus,* with the heads of the pleurites II to V extending far under succeeding segment; pleurites are narrow dorsally, with a narrow, submarginal, pitchy black stripe, but wider on ventral side and paler; tergites are entire and rather deeply and unformly pigmented, almost filling the segments; sternites are also entire transversely, but widely separated from pleurites and deeply and uniformly pigmented; the genital sternite is large, covering median portion of segments VII and VIII and anterior part of IX; segment IX is longer than VIII and almost as wide, proportionately much larger than in *foedus.*

The legs are well developed and stout, as in *foedus,* with same style of marginal carinae; antennae are also similar.

The male genitalia are not clearly visible and could not be figured, but they apparently differ very little from those of *foedus,* excepting in size, the basal plate being slightly narrower basally, but the whole mesosome wider. A single female in my own collection from *Pyrocephalus rubinus saturatus* (Venezuela) seems to be inseparable from the Mexican material. The species is represented by the male holotype, female allotype, 1 male and 6 female paratypes.

MEASUREMENTS OF *P.* (*Tyrannicola*) *foedus* AND *P.* (*T.*) *rubina.*

	foedus				*rubina*			
	Male		Female		Male		Female	
	length	Width	length	Width	length	Width	length	Width
Body	1.54	.....	1.89	.....	1.31	.....	1.67	.....
Head (at clavi)	.337	.337	.....	.38	.....	.293	.....	.358
Head (at temples)	.51	.38	.553	.412	.456	.338	.52	.39
Prothorax	.135	.263	.14	.27	.14	.22	.152	.24
Pterothorax	.174	.412	.195	.423	.13	.314	.14	.36
Abdomen	.80	.542	1.085	.586	.66	.347	.998	.565
Antennae	.26	.06	.217	.054	.217	.054	.195	.043
Basal plate	.158	.115			.12	.10		
Paramer	.074	.026			.05	.018		
Mesosome	.077	.09			.095	.097		

Genus *Lunaceps* Clay & Meinertzhagen, 1939
Genotype: *Docophorus actophilus* Kellogg & Chapman,
Lunaceps pusillus, n. sp.[6]
(Figures 50 and 51)

Type, male adult, from *Ereunetes pusillus* (Linné), collected by G. H. Lowery at Lawrence, Kansas, May 15, 1947 (in coll. L. S. U. M. Z.).

[6] Timmermann has recently described eleven new species of this genus, only one of which I possess (*drosti*), but with the exception of one host (*Ereunetes mauri*) all are Old World species or of genera very different from *Ereunetes.* I have not yet seen this paper. It is possible that the present species (*pusillus*) will closely resemble *cabanisi* Timmermann, from *E. mauri.* Measuresments appear after the next species.

Fig. 43a. *Degeeriella angusta* (Giebel) ♀ head, thorax, and abdominal segment I
Fig. 43b. *D. angusta* (Giebel) ♀, front of head
Fig. 44. *D. angusta* (Giebel) ♂, genitalia
Fig. 45. *Picicola praeposterus americana*, n. subsp. ♂, head, thorax, and portions of abdomen.
Fig. 46. *P. p. americana*, n. subsp. ♂, genitalia portions of abdomen
Fig. 47. *P.* (*Tyrannicola*) *foedus* (Kell. and Chap.), ♂, head, thorax, and portions of abdomen
Fig. 48. *P.* (*Tyrannicola*) *foedus* (Kell. and Chap.) ♂, genitalia
Fig. 49. *P.* (*Tyrannicola*) *rubina*, n. sp. ♂, head, thorax, and parts of abdomen; tip of ♀ abdomen
Fig. 50. *Lunaceps pusillus*, n. sp. ♂, head, thorax, and portions of abdomen
Fig. 51. *L. pusillus*, n. sp. ♂, genitalia
Fig. 52. *L. wilsoni*, n. sp. ♂, head, thorax, and portions of abdomen
Fig. 53. *L. wilsoni*, n. sp. ♂, genitalia

DIAGNOSIS.—The head, thorax, and abdomen are narrower than in *actophilus*, the shape of the head being more nearly as in *phaopi* (Denny), but the pterothorax, as well as the abdomen, is much narrower, and the marginal carinae of the head and the thorax are quite different, as is also the anterior plate of the head; there are also differences in the male genitalia.

From *numenii* (Denny) it differs in more slender and differently shaped thorax and abdomen, more slender legs and decidedly different male genitalia and thoracic carinae.

C. drosti Timmermann is also quite different, more closely resembling the species *actophilus* in the shape of its head, and in other characters.

The male genitalia of the type are partially obscured by foreign matter (at basal portion of paramers and endomera), so that a complete figure was impossible to draw. The genitalia of the single male paratype are in much worse condition. This is unfortunate, since the genitalia are very important characters for separating these closely related species. No females were taken. The species is represented only by the male hototype and 1 male paratype.

Lunaceps wilsoni, n. sp.[7]
(Figures 52 and 53)

Type, male adult, from *Charadrius w. wilsoni* Ord, collected by D. S. Farner near Lawrence, Kansas, May 25, 1946 (in L. S. U. M. Z. coll.).

DIAGNOSIS.—This species seems to be closer to *actophilus* in shape of head and body segments. The head is, however, narrower in anterior portion, as well as more attenuated and longer in the portion anterior to the preantennal suture; it also lacks the prominent, deeply colored, narrow submarginal carina which in *actophilus* encircles the whole front of the head, anterior to the suture; there is a slight difference in the pattern of the preantennal carinae.

The thoracic carinae differ in shape, while the acetabular bars of the 2nd pair of coxae are entirely different, those of *wilsoni* being quite complicated and apparently unique (see figure).

The paramers are thicker apically and less curving and lack the strongly developed nodi on inner side at base to which the endomera is attached; the apical prongs of the endomera are twice as long in *wilsoni* as in *actophilus*, and the whole endomera is slightly shorter (.076 x .038 against .087 x .04). The species is represented by a single male, the holotype.

Genus *Brüelia* Keler, 1936

The genotype of Brüelia is *Nirmus brachythorax*, 1936, Giebel, from *Bombycilla garrulus*, and is of the same type as quite a large number of species found on the Thraupidae and Fringillidae of the Western Hemisphere, it seems to be nearest to *B. angustifrons* (Carriker) but has wider temples, while *cedrorum* (Piaget) is apparently very close to *infrequens* (Carriker) but has a wider frons and the sides of the preantennal portion of head are straight, not flatly convex. The species of this group are closely related and not easy to separate, but I doubt very much that exactly

[7] A single male from *Charadrius wilsoni beldingi*, collected on the Pacific coast of Colombia, S. A., is very close to *wilsoni*, as would be expected, but seems to be subspecifically distinct.

the same subspecies is found on any two host species. It seems advisable at this time, in connection with the description of new species of the genus to review some of the old species described from New World hosts and to publish new, enlarged figures of them. The species most commonly recorded from North American passerine birds is *B. vulgata* (Kell.), which the describer has listed from quite a number of hosts. This species will be considered first.

MEASUREMENTS OF THE TYPES OF *L. pusillus* AND *L. wilsoni*.

	pusillus		*wilsoni*	
	length	width	length	width
Body	1.52		1.57	
Head (at clavi)		.175		.217
Head (at temples)	.36	.23	.37	.255
Prothorax	.13	.14	.13	.198
Pterothorax	.163	.187	.163	.282
Abdomen	.93	.24	.955	.303
Antennae	.14	.03	.14	.038
Basal plate	.084	.051	.115	.054
Paramers	.097	.056	.105	.07
Endomera	.077	.033	.076	.038

Brüelia vulgata (Kellogg), 1896
(Figures 54 and 55)

Nirmus vulgatus Kellogg, Occ. Pap. California Acad. Sci. (2)6, p. 495, pl. 67, fig. 5. Eight hosts are given.

Kellogg did not designate any particular host as the type, and we cannot be certain which host furnished the specimens from which his description and figure were made and from which measurements were taken. The first host mentioned is *Carpodacus purpureus californicus*, which, accordingly may be accepted as the type host. Whether or not the material from the other hosts given by him is identical with the specimens from *Carpodacus* cannot be determined without actual examination of the material. I have not seen specimens from *Carpodacus purpureus* but have specimens from two species of finches (*Zonotrichia querula* and *Passerherbulus caudacutus*), which agree very closely with Kellogg's description and figure of *vulgatus*. One of the hosts given by Kellogg was *Zonotrichia coronata*.

There is considerable variation in head measurements of females from the same bird, for example females from *Zonotrichia querula* measure: .36 x .282; .40 x .305; and .38 x .303. Kellogg's measurements for the female head are .37 x .29. Females from *Passerherbulus* measure: body, 1.63 x .435 and 1.67 x .40; head, .37 x .29 and .39 x .303. Males of the above series are somewhat smaller than Kellogg's measurements: body, 1.31 x .36 and 1.28 x .37; head, .31 x .25 and .345 x .25, against Kellogg's 1.47 x .40 and .33 x .28, but here again we have much individual variation. It will be seen that in the above measurements a female from both *Zonotrichia* and *Passerherbulus* has exactly the same head measurements as given by Kellogg for the type

of *vulgata*, viz: .37 x .29, but males from both hosts have heads of slightly different proportions (.345 x .25 and .31 x .25 against .33 x .28).

The figures of *vulgata* here presented are specimens from *Passerherbulus caudacutus*. The genitalia of the male from *Zonotrichia querula* are exactly the same as those shown from *Passerherbulus*, except that they are slightly smaller in size, while those of *B. parabolicybe* (Carr.) are of the same type, but have shorter, narrower paramers and smaller endomera.

B. vulgata may be recognized by the shape of the head and thorax and the detailed structure of these parts. The frons is narrow, with the entrance to the buccal cavity extremely small and with a rounded, hyaline proturberance (see figure). The buccal canal expands laterally to a point halfway to the buccal cavity, then abruptly narrows to same width as at frons. The buccal cavity is extremely small, being almost filled by the well developed mandibles.

Kellogg says that there is no "signature," but there is present a very minute one, rounded and pointed anteriorly, not easily distinguishable; he also gives the pterothorax as having a "flatly rounding posterior margin," which is incorrect, it being angulated medially, as in all of the species of this group here treated, excepting *parabolocybe*, in which it *is* flatly convex.

The thoracic segments are small, but abdominal segment I is usually *long* (see figure). The shape of the head in *vulgata* is closest to that of *infrequens* (Carriker), excepting that it is considerably narrower at temples, clavi, and frons and the buccal cavity is much smaller and the canal narrower and of a different shape; there is a slight emargination of the lateral margin of the head at the anterior end of the preantennal carinae, which is quite noticable and characteristic of the species. The genital sternite is very similar in this whole group, but unfortunately the male genitalia are wanting in several species. In my specimens, which I have called *vulgata*, the abdominal tergites of the female are closer together medially than stated by Kellogg ("a rather broad, uncolored median line"), while in the male they are almost touching. Kellogg also states that there is but one seta at the posterolateral angles of the abdomen, but there are 2 setae in my specimens in segments III to VI, 3 in VII, 1 in II and none in I. There is a single seta set on posterior margin of tergites I to VI, just inside the head of the pleurites, quite small on I and increasing in length to VI.

I do not assume that the insect here described and figured is typical *vulgata*, since it has not been compared with Kellogg's type or with specimens from its supposed host (*Carpodacus purpurascens californicus*) but merely compared with Kellogg's description and figure. It certainly is conspecific, if not subspecifically the same.

Brüelia infrequens (Carriker), 1902
(Figure 56)

Nirmus infrequens Carriker, Jour. New York Ent. Soc., V, 10, p. 220; pl. 20, fig. 5. Host: *Calcarius l. lapponicus;* type in coll. of M. A. C.).

Diagnosis.—The head is perhaps nearest in shape and structure to that of *vulgata* (as given in this paper) but differs in being wider at temples, clavi, and frons; the preantennal carinae are wider, the anterior

plate much larger and crescent-shaped; the buccal canal is much shorter and almost uniform in width; and the buccal cavity is much larger.

In *vulgata* the clavi are minute, pointed and colorless (as stated by Kellogg) but plainly visible, as in *infrequens*, although very difficult to observe in this species. The prothorax is much wider in *infrequens* but of same shape (sides strongly convex); the pterothorax is also much wider, with sides straight (convex in *vulgata*); and the thoracic carinae also differ (see figure). There is practically no difference in the abdominal sclerites, but the abdomen is somewhat wider. Measurements follow the next species.

Brüelia angustifrons (Carriker), 1902
(Figure 57)

Nirmus angustifrons Carriker, Jour. New York Ent. Soc., vol. 10, p. 221; pl. 21, fig. 2. Host: *Chondestes grammacus strigatus* Swainson, Bad Lands of Sioux Co., Nebraska.

Diagnosis.—This species has a very long, narrow head, very long in the preantennal portion. It is about the same width as in *vulgata* at temples but narrower at clavi, and the sides of head (anterior to clavi) are very flatly convex. The frons is about equal in width to that of *infrequens*, but buccal canal is wider, slightly expanded medially, and longer than in either *vulgata* or *infrequens*. The dorsal preantennal carinae are just as in *vulgata*, but the inner, ventral carinae differ (see figure); the anterior plate is round, as in *vulgata*, but longer; the thoracic segments are very similar to those of *vulgata*, except that the sides of the pterothorax are slightly concave instead of convex and the posterior margin is bluntly pointed medially (not flatly convex as shown in the figure here given). The abdominal sclerites are very similar to those of *vulgata*, excepting the genital sternite, which differs from that of both *vulgata* and *infrequens* (see figure). No males were taken, but "numerous females." Type and paratypes are in collection of M. A. Carriker.

Measurements of Female Holotype of *B. infrequens* and *B. angustifrons*.

	infrequens		*angustifrons*	
	length	width	length	width
Body	1.65		1.66	
Head (at clavi)		.275		.24
Head (at temples)	.38	.33	.38	.277
Prothorax	.12	.205	.12	.184
Pterothorax	.174	.314	.163	.284
Abdomen	.92	.42	1.05	.39

Brüelia parabolocybe (Carriker), 1903
(Figure 58)

Nirmus parabolocybe Carriker, Univ. Nebraska Stud. III, p. 137, pl. 2, fig. 3. Host: *Tyrannus melancholicus chloronotus*, Costa Rica (type in coll. of M. A. C.)

Diagnosis.—This is a well-marked species easily distinguished from the three previous species by the shape of the head, which is very broad at

the frons, the whole frontal end being broadly rounded, with sides very slightly concave in front of the clavi. The preantennal carinae are wide, with inner margin corrugated and narrowly pitchy black, the outer portion pale brown; the marginal temporal carinae are narrow, submarginal, and pitchy; and the buccal canal is very wide, expanding posteriorly to the transverse, curving anterior plate. Prothorax wide, as in *infrequens*, but considerably longer; pterothorax long and narrow posteriorly, with convex sides and *flatly rounded* posterior margin; thoracic sternal plate narrow as in *vulgata*, but of almost uniform width. Abdomen rather similar in size and shape to that of *infrequens*, but the dorsal markings of the pleurites differ (see figure); segment VIII is wide and transverse, with IX very small; the genital plate is large, being slightly longer than in any of the three previous species, but with the shape of that of *vulgata*.

The genitalia of the male allotype are small, especially the paramers and the endomera, and cannot be clearly seen for drawing, the paramers being doubled back over the endomera, but they seem to be similar to those of *vulgata*. Measuresments are given with those of following species.

Brüelia straminea (Denny), 1842
(Figures 59 and 60)

Nirmus stramineus Denny, Mon. Anop. Brit., p. 53, 139; pl. 8, fig. 9. Host: *Dendrocopus major anglicus*.

This is the first record of the taking of *Brüelia* on any New World species of Picidae, although two species, *B. superciliosa* (Nit.) and the present one, are known from European woodpeckers.

A series of 5 males, 1 female and 3 nymphs were taken on *Melanerpes carolinus zebra*, collected by G. H. Lowery near Lawrence, Kansas, on October 27, 1946, and are in the collection of the Louisiana State University Museum of Zoology.

In my own collection is a single female sent me by Col. Emerson, collected in Oklahoma, from the same host. In the L. S. U. M. Z. collection are 2 females from *Sphyrapicus varius*, collected by R. Newman at Cerro Conejo, S. L. P., Mexico, which seem to be very close to the series from *Melanerpes*, but they are in no condition for identification. I, also, have a good series of *Brüelia* from *Melanerpes formicivora flavigula* and *Chrysoptilus a. atricollis*, the former close to *straminea* but the latter quite different, possibly somewhat like *superciliosa* (Nit.), considering the shape of the head.

There are very few discrepancies between Denny's description, as far as it goes, and these specimens, while the figure also agrees very well. He says: "vertex concave," but it is flatly convex in these specimens; he further says: "prothorax transverse, rotundate before and behind." The meaning of this phrase is not entirely clear to me, but at any rate the prothorax has convex sides, rounded anterior margin and transverse posterior margin. The "metathorax" is also wider than the head in my specimens and has a rounded posterior margin. Until actual comparison can be made with typical *straminea*, it seems best to identify these specimens as that species.

Referring to the species treated in this report, *B. straminea* resembles most strongly *parabolocybe* (Carr.), from which it differs in larger size and much paler coloration throughout; head wider at temples and clavi, and with temples less rounded; sides of preantennal portion of head more divergent and anterior portion less rounded; the preantennal carinae narrower but

otherwise similar; chaetotaxy of head the same; prothorax very similar, but pterothorax much wider and with sides straight instead of convex.

The abdominal sclerites are very similar to those of *parabolocybe*, but much paler in color, and the abdomen is more pointed posteriorly (see figure).

The male genitalia differ from those of all of the males treated in this paper. There is no unusual difference between the sexes, merely the usual sexual dimorphism of size and shape of apical segments of the abdomen.

MEASUREMENTS OF SPECIMENS OF *Brüelia straminea* AND *B. parabolocybe* (Carr.).

	B. straminea				*B. parabolocybe*			
	Male		Female		Male		Female	
	length	width	length	width	length	width	length	width
Body	1.46	.....	1.84	.....	1.38	.....	1.73	.....
Head (at clavi)	.....	.26	.....	.282	.....	.22	.....	.25
Head (at temples)	.35	.314	.41	.336	.326	.27	.393	.314
Prothorax	.108	.185	.13	.24	.12	.195	.15	.22
Pterothorax	.195	.303	.205	.37	.14	.255	.185	.293
Abdomen	.89	.412	1.21	.50	.835	.347	1.13	.423
Basal Plate	.13	.07			.13	.06		
Paramers	.043	.053			.026 (?)	..		
Endomera	.026	.04			.02	.03		

Brüelia longifrons, n. sp.
(Figure 61)

Type, female adult, from *Parus atricapillus longicaudatus* Harris, collected by D. S. Farner, Douglas Co., Kansas, March 29, 1947 (in L. S. U. M. Z. coll.).

Dr. Kellogg has recorded *B. vulgata* from *Parus atricapillus*, but I suspect that what he had was the species described below, which, while resembling *vulgata* in some ways, differs very much in others. Unfortunately no male of *longifrons* was taken.

DIAGNOSIS.—A large species, the largest of the *vulgata* group, the female measuring 1.82 x .50. The head has a peculiar shape, the preantennal portion being very long, with flatly convex sides; the frons is of medium width and concave margin; the buccal canal narrows abruptly at posterior edge of the small, semilunar anterior plate, then gradually narrows to a very constricted opening into the long, narrow buccal cavity. No other species treated in the present report has a buccal canal approaching in shape that of the present species. The antennal sinus is V-shaped, with constricted inner end; the preantennal carinae are narrow, marginal, and pitchy black, but deeply shaded along inner side (see figure), the shading not uniform, but somewhat scalloped; the marginal temporal carinae are

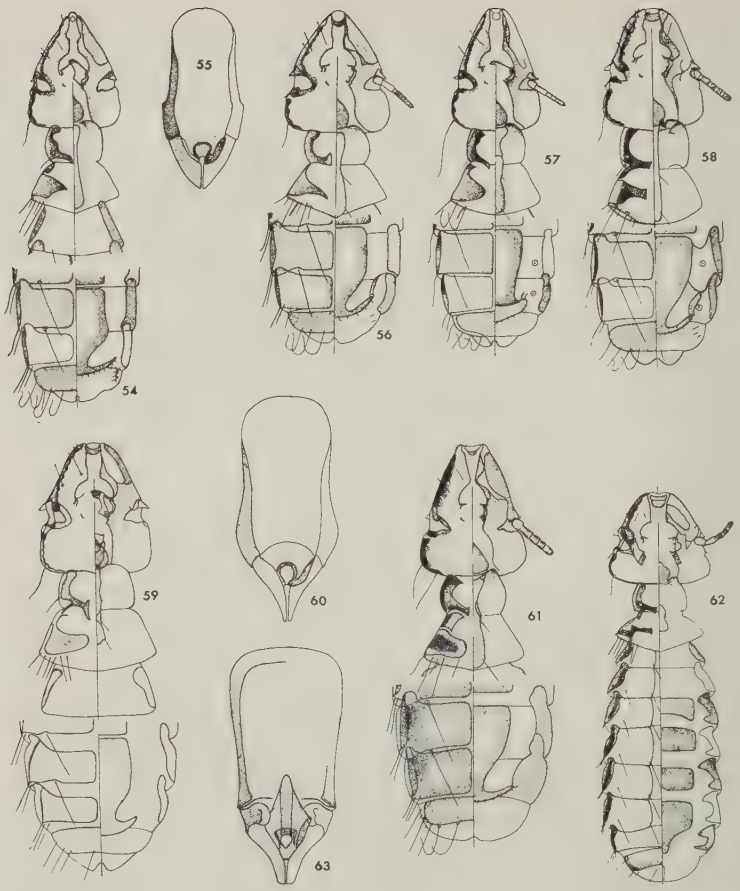

Fig. 54. *Brüelia vulgata* (Kell.) ♀, head, thorax, and portions of abdomen
Fig. 55. *B. vulgata* (Kell.) ♂, genitalia
Fig. 56. *B. infrequens* (Carr.) ♀, head, thorax, and apical segments of abdomen
Fig. 57. *B. angustifrons* (Carr.) ♀, head, thorax, and apical segments of abdomen
Fig. 58. *B. parabolocybe* (Carr.) ♀, head, thorax, and apical segments of abdomen
Fig. 59. *B. straminea* (Denny) ♀, head, thorax, and portions of abdominal segments
Fig. 60. *B. straminea* (Denny) ♂, genitalia
Fig. 61. *B. longifrons*, n. sp. ♀, head, thorax, and apical segments of abdomen
Fig. 62. *B. nitzschi moriona*, n. subsp. ♀, entire body
Fig. 63. *B. n. moriona*, n. subsp. ♂, genitalia

also pitchy black, and corrugated along inner edge, with adjacent area deeply shaded; the gular plate extends beyond occipital margin.

The pterothorax has straight sides, while the sides of the flatly pointed posterior margin are also straight; the thoracic carinae are also deeply colored and the thoracic sternite of distinct shape.

The abdomen is of the usual shape and structure of the *vulgata* group. The pleurites are narrow and of medium coloration, with a marginal hyaline border; the color of the pleurites becomes paler anteriorly, those of I and II being almost uncolored and III slightly colored. In fact almost the entire portion of segments I and II is without color, excepting a slight patch of brown on anterior portion of tergite adjoining the pleurite. Segments IV to VIII are of normal color, as shown in figure. The tergites are rather deeply colored contiguous to the paratergals, paler in median portion, and are more deeply colored than in most of the *vulgata* group. The genital sternite is typical of this group. The remaining sternites are of same density of color in V and IV, paler in III, and practically invisible in II and I. The chaetotaxy is characteristic of the group. The legs are unusually small, with much thickened femora and tibiae, the latter with expanded, rounded ends with one long straight claw and the other very minute; pitchy bands cross subapical portion of tibiae and various parts of femora.

The species is represented by a single specimen, the female holotype. Measurements appear with those of following species.

Brüelia nitzschi moriona, n. subsp.
(Figures 62 and 63)

Types, male and female adults, from *Psilhorinus morio* (Wagler), collected by M. Newman at Xilitla, S. L. P., México, February 14, 1947 (in L. S. U. M. Z. coll.).

DIAGNOSIS.—Very similar to *B. nitzschi* Keler from *Cyanocorax cyanomelas*. The markings of the head, thorax and abdomen are exactly the same; the length of the female is the same (1.88), but head measurements differ (.49 x .45 against .442 x .454). The male measures (body) 1.49 against 1.47 for *nitzschi*; head, .445 x .44 against .405 x .417. The head in *moriona* is narrower at the clavi, with sides of preantennal area less convex, so that the whole head presents a somewhat triangular shape, with the three angles rounded, while in *nitzschi* the head has a more squarish appearance.

All of the segments of the legs are short and stout, largely hyaline, but with pitchy markings on both femora and tibiae; the 1st and 2nd segments of the antennae are hyaline, the last three deeply colored except for a narrow band across base.

Keler gives no data at all on the male genitalia, which in *moriona* are quite large for this genus, especially the paramers (see figure). The male is much smaller than the female, with a short, rounded abdomen (.85 x .58 against 1.20 x .54) and a protruding, rounded apical segment; the shape of head and thorax is the same, but smaller; the markings of the abdomen are also quite similar, though the genital sternite is slightly different in shape.

Comparison with other related species shows the following differences: the shape of the head is similar to that of *varia* (Burm.) from

Corvus monedula, but the markings are quite different; the abdominal markings are similar, but not the same; the head is much more pointed than in *multipunctata* (Clay) from *Nucifraga multipunctata*, while markings of both head and abdomen differ. It is also quite different from both *biocellata* (Piaget), *nigripicti* (Carriker) and *rotundata* (Osborn), all three from species of Corvidae.

Specimens from *Cyanocorax chrysops* (So. Bolivia) are extremely close to *nitzschi*, practically inseparable without the genitalia. Specimens from *C. violaceus* (E. Peru), while of the same type, have sides of preantennal area quite straight and frons narrow, with sides of temples less convex. Three males from *C. cyanus* (Venezuela) are also very close to *nitzschi*. A single male from *C. affinis* (Colombia) has the head the same shape as *moriona*, but small, as in *nitzschi*. A pair from *Xanthoura yncas* seems to be a distinct species. The new form is represented by female holotype, male allotype and 3 female paratypes, also 2 other females and a nymph from the type host.

MEASUREMENTS OF *B. longifrons* AND *B. nitzschi moriona*.

	B. longifrons				*B. n. moriona*	
	Female		Male		Female	
	length	width	length	width	length	width
Body	1.82	.....	1.50	.....	1.91	.....
Head (at clavi)	.....	.26	.....	.358	.....	.415
Head (at temples)	.40	.33	.445	.445	.48	.495
Prothorax	.14	.205	.163	.27	.163	.293
Pterothrax	.185	.31	.17	.445	.195	.477
Abdomen	1.18	.50	.855	.586	1.20	.54
Antennae	.....	.....	.24	.045	.24	.045
Basal Plate			.18	.13		
Paramers			.095	.105		
Endomera			.10	.06		

(*To be continued*)

THE MEDITERRANEAN FRUIT FLY INFESTS FLORIDA AGAIN: EARLY CHRONOLOGY

April 13, 1956: Mr. O. L. Prior, 93 N.W. 93rd Street, Miami Shores, Florida, found insect larvae in grapefruit that he was preparing to eat. He called the Miami Herald and they referred him to the Assistant County Agent Douglas M. Knapp. Mr. Knapp carried the larvae to Dr. D. O. Wolfenbarger, Entomologist, at the Sub-Tropical Experiment Station, Homestead. Dr. Wolfenbarger recognized the possibility of these larvae being Mediterranean fruit fly (*Ceratitis capitata* [Wied.]). He contacted Mr. C. E. Shepard, regional inspector for the State Plant Board. One larva was forwarded to the entomological department at Gainesville, and two larvae were forwarded to Dr. W. L. Popham, Director of the Crops Regulatory Program, Agricultural Research Service, Washington, D.C. A tentative determination of Mediterranean fruit fly was made of the larvae by the State Plant Board and by Dr. R. H. Foote, Federal fruit fly identification specialist for the Bureau.

April 18, 1956: Mr. Ed L. Ayers, the Plant Commissioner, directed Mr. H. A. Denmark, Acting Chief Entomologist, to go to the infested area in Miami to collect adults with McPhail traps.

April 19: Mr. Denmark met C. E. Shepard and E. F. Miles and traps were set up on the properties of Messrs. Prior, 93 N.W. 93rd Street, Dario Mazzoleni, 71 N.W. 93rd Street, and A. Scheeschmidt, 101 N.W. 93rd Street. Eleven adults of the Mediterranean fruit fly were collected in the McPhail traps on the property of Mr. Prior at 8:30 p.m. Mr. Shepard was notified, and a night letter was sent to Dr. Popham as follows: "CAUGHT MEDITERRANEAN FRUIT FLY IN SWEET BAIT TRAPS. AM FORWARDING SPECIMENS."

April 20: Nine more adults were caught on Mr. Prior's property. Three adults were caught on Mr. Scheeschmidt's property, and one adult on Mr. Mazzoleni's property.

A visit was made to the Sub-Tropical Experiment Station to inform Dr. Wolfenbarger that the infestation was definitely Mediterranean fruit fly. The information was released to the public on April 23 by Mr. Jack Matthews from Lakeland.

April 21: Seven more adults were caught on Mr. Prior's property, and one adult on Mr. Mazzoleni's property. Mr. Shepard and the inspectors for the Miami area continued to scout areas around the original infestation, and spread out in each direction for several blocks. Infestations were located at 9826 N.W. First Avenue, 148 N.W. 90th Street, 3078 91st Street, 85 N.W. 94th Street, 93 N.W. 97th Street, and 78 N.W. 95th Street.

April 23: One more adult was collected on Mr. Prior's property. The traps were picked up and relocated. One trap was placed at 1958 N.W. 42nd Avenue at the edge of a tomato field, since the owner suspected his tomatoes to be infested. All tomatoes examined were infested with *Euxesta* sp. No Mediterranean flies were caught in the McPhail trap. A second trap was located at 7425 S.W. 2nd Street, the third trap at 308 E. 9th Street, the 4th trap at 301 E. 16th Street, Hialeah. The 5th trap was placed at 2984 E. 6th Avenue, the 6th at 710 E. 39th Street, the 7th at 597 E. 38th Street, and the 8th and 9th at 4435 E. 8th Avenue.

Dr. R. H. Foote, of the U. S. National Museum, arrived the evening of the 23rd, and plans were discussed for setting up a laboratory to make determinations.

April 24: Messrs. Ed L. Ayers, N. O. Berry, R. H. Foote, and H. A. Denmark met at the Cortez Hotel to make plans for a survey and trapping for the fruit fly. Mr. Ayers set up his headquarters at the office of the County Agent, at 2690 N.W. 7th Avenue.

Spraying and picking crews were located at E. 4th Avenue and 131st Street, Hialeah Race Track. Dr. R. H. Foote, G. W. Dekle, and H. A. Denmark are located at 2204 Salzedo Street, Coral Gables, at the office of the Wild Cotton Eradication crew. Mr. N. O. Berry was also located at this address to conduct large-scale McPhail trapping.

April 20: Mr. Berry arranged for three thousand traps and eight men to arrive in Miami on April 30. He planned to use partially hydrolyzed yeast portein as an attractant.

April 27: A meeting of the State Plant Board was held at the Chamber of Commerce building to discuss the plan of eradication of the Mediterranean fruit fly. Mr. Fred H. Kent, Chairman of the Board, and Governor LeRoy Collins attended this meeting and offered their support to a program to eradicate the fly. Mr. Ayers gave a general review of the fruit fly situation to date, and Mr. Berry was called upon to express his opinion of the situation and the size of the task. Mr. Berry estimated a campaign of two to three years. Mr. E. P. Reagan explained the condition of baggage inspection, which needs revision according to him and Mr. Ayers. Mr. Reagan has made an on-the-spot check of the Mediterranean fruit fly situation in Costa Rica, which is the closest infestation to the United States. Mr. H. G. Clayton, Director of the Extension Service, pledged his support and offered the help of any of the county agents in the areas of infestation. Dr. Ralph Miller, member of the State Plant Board, reviewed the situation and emphasized the importance of an eradication program. Senator Jim Haley pledged his support and offered to do everything possible to get federal aid.

April 27: There were 89 infestations that had been positively determined as the Mediterranean fruit fly. The infestation extends as far north as Hollywood in Broward County. Six infestations have been located on Miami Beach to the east; 3 infestations have been located in Hialeah to the west; and one infestation extends to Kendall on the south. The heaviest infestations are located in the Miami Shores area.

April 27-28: Fruit picking began in the Miami Shores area and in the Biscayne Park area April 28.

April 30: Spraying operations began with ground equipment. The equipment was furnished by the State Plant Board and additional equipment was hired from B. & L. Farms.

May 3: Mr. Wilber Charles was appointed to direct the Mediterranean fruit fly campaign. Mr. E. G. Donahue was placed in charge of road blocks. Their office is located at 2690 N.W. 7th Avenue, Miami, 37.

May 4: Messrs. N. O. Berry, W. R. Heard and F. D. Bittner, H. A. Denmark and W. Charles met to organize the trapping of the fruit fly in the citrus belt as far north as Marion County. Mr. Berry, USDA, in charge of the trapping operations and located at 2204 Salzedo Street, Coral Gables, made arrangements for county agents, production managers and/or

Plant Board Inspectors to operate the McPhail traps. The traps will be inspected once or twice a week and specimens sent to the Miami office for determination.

The attractant for the fruit fly is 2 pounds of partially hydrolyzed yeast protein, 2 pounds ammonium chloride, which is added to enough water to make 5 gallons. This will bait approximately 50 traps. The bait sprays consist of 2 pounds of 25% wettable malathion, 1 pound of partially hydrolized yeast protein, or 2 pounds of sauce bait No. 2 in 100 gallons of water.

Messrs. H. A. Denmark, in charge of determinations, and G. W. Dekle are located at 2308 Salzedo Street, Coral Gables.

Mr. C. E. Shepard, in charge of field operations, under whose directions fruit inspection, supervised by Mr. K. P. Bragdon, spraying, supervised by Mr. L. W. Holley, clean-up and fruit picking supervised by Mr. T. E. Whitmore, and Mr. G. B. Ellis, assistant to Mr. Shepard, are located at E. 31st and 4th Avenue, Hialeah.

A fumigation station will be set up at the Hialeah Race Track. Eight ounces per 1000 cubic feet of ethylene dibromide for a period of 2 hours, under supervision of a Plant Board man, will be used for citrus, and 10 ounces for the same period of time and area will be used for mangoes. Green, wrapped tomatoes and green limes will not have to be fumigated.

Road blacks have been set up on highways: Fla. A1A, US 441, and Fla. 27 (Krome Avenue) leading to US 41.

May 14: Kendall remains the southernmost point of infestation and Pompano Beach the northernmost.

H. A. Denmark,
State Plant Board,
Gainesville, Florida

Additions to the United States List of Hemiptera: These five species, all well known in Cuba, were among some Hemiptera from southernmost Florida recently received for determination from the Entomology Division of the State Plant Board of Florida. The first is a scutellerine pentatomid, the others are Coreidae.

Augocoris illustris (Fabr.). One female representing the immaculate color form of the species, from Key Largo, at light, Feb. 26, 1956.

Leptoglossus stigma (Herbst). One female, taken on lychee at the Plant Introduction Station near South Miami, June 7, 1956.

Setheniva ferruginea Stål. Three specimens from Key Largo, Feb. 13, 1956. I have also seen a specimen from Dade County, collected some twenty years ago, in the University of Michigan Museum of Zoology.

Zicca taeniola Dallas. Apparently well established in Dade County. One specimen from Miami, April 30, 1954; three from Matheson Hammock, just south of Miami, Oct. 22, 1954; five from Homestead, March 1, 1956. Though Van Duzee doubtfully listed this species from "N. Am." in his 1917 catalog, these are the first definite records of which I have knowledge.

Megalotomus rufipes (Westwood). A female from Key Largo, Feb. 26, 1956, is darker than most individuals of this common West Indian species.

Roland F. Hussey,
Department of Biology,
University of Florida

MEMBERSHIP LIST OF THE FLORIDA ENTOMOLOGICAL SOCIETY

The following list of members has been compiled from the records of the Society. Any discrepancies should be reported to either the secretary or the business manager. Honorary members are indicated by having their names followed by a double asterisk; student members have a single asterisk.

Edwin B. Acree, 19140 N. Miami Ave., N. Miami, Fla.
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Observations on the Mating Behavior of the Green June Beetle, Cotinus Nitida (Linn.): On the hot, sunny morning of August 12, 1955, my attention was directed to a young cabbage palm. Advancing toward a sound similar to many tiny airplane motors, I saw the source of the noise —insects, not airplanes.

There were about a dozen green June beetles (*Cotinus nitida*) circling the palm and alighting now-and-then to rest. Occasionally one would dart off and describe a wide arc, about a foot above the ground. Numerous individuals were flying slowly about 3 or 4 inches above the freshly mowed lawn. Following a zig-zag course, a beetle would circle back and suddenly drop to the turf and disappear.

Upon investigation of the spot where a beetle had disappeared, I found not one, but two insects. They were mating, the male clasping the female by means of the front tarsi, which were hooked around the anterior edge of the pronotum. A mating pair could be handled without disturbing it, which is unusual for so wary an insect.

The females burrowed just under the turf, not into the soil, where the males located them, probably through an olfactory stimulus. Apparently, sight, sound or motion were not factors, as males were attracted to remnants of females killed by the mower. A few beetles dropped to examine a burrow no longer occupied.

The turf expanse was bordered on one side by a small wooded area which was heavily overgrown by muscadine grape vines, but no beetles were feeding either on this or on other grapes. A dense vine of *Ampelopsis arborea* had overgrown a small oak tree, and formed a center around which more than a hundred of these insects gravitated. Many of the beetles were resting or crawling excitedly over one another, but no mating was observed.

A similar "swarming" activity was noted the previous week, centered around a small pecan tree, and in the late summer of 1954 I watched this peculiar rotation around some persimmon trees.

Constance Nicholas Patton
Department of Entomology
University of Florida

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